

GAMES

BATTLESHIPS SOLVING GUIDE

Battleships puzzles are a solitaire version of the classic paper-and-pencil game of the same name. The object of each puzzle is to find the locations of the 10 ships in the fleet hidden in a section of ocean represented by the 10×10 grid. The fleet consists of one battleship (four grid squares in length), two cruisers (each three squares long), three destroyers (each two squares long), and four submarines (one square each).

The ships may be oriented either horizontally or vertically in the grid, but no two ships will occupy adjacent grid squares, even *diagonally*. The digits along the side of and below the grid indicate the number of grid squares in the corresponding rows and columns that are occupied by vessels. In nearly all Battleships puzzles, the contents of a few of the squares have been revealed to start you off. These “shots” come in four types:

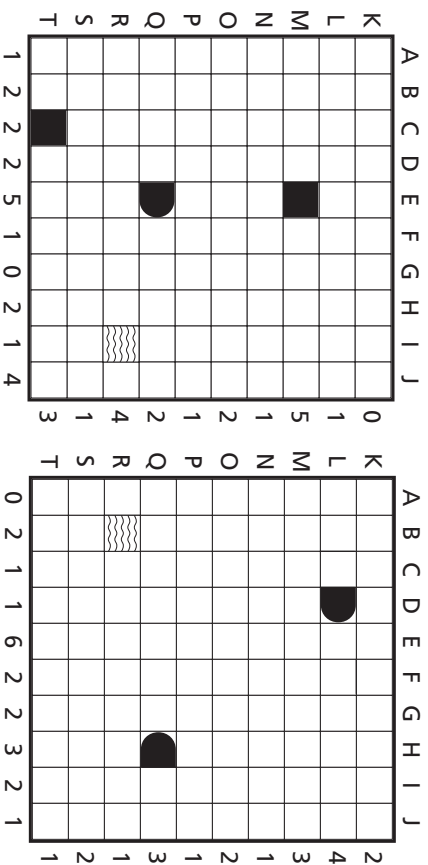
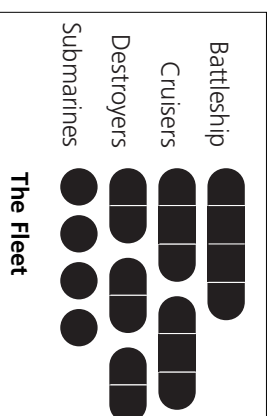


Figure 1.1

Figure 2.1

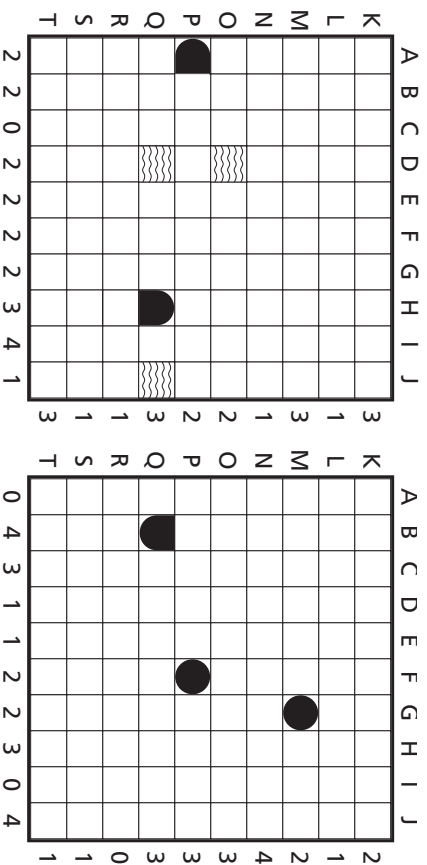


Figure 3.1

Figure 4.1

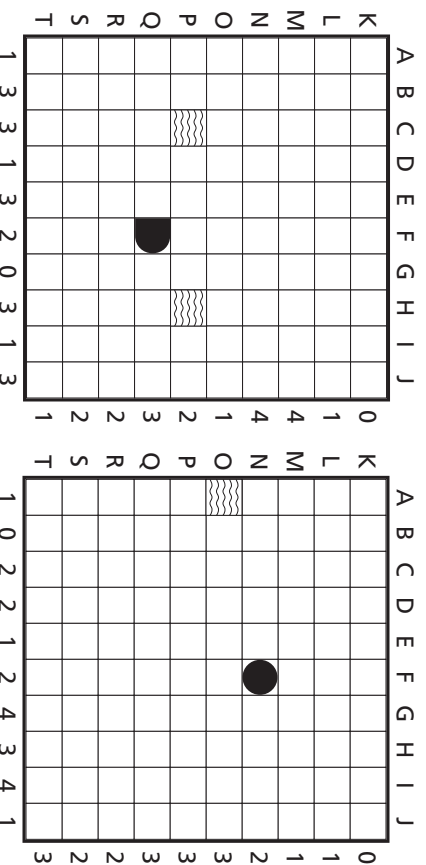


Figure 5.1

Figure 6.1

Water This square contains no ship.

Submarine This square consists of a submarine, and thus must be surrounded by water.

End of a ship This square can be oriented in any of four directions. It indicates the end of either a destroyer, cruiser, or battleship. The square adjacent to the flat side must be occupied by a ship segment. All other surrounding squares are filled with water.

Middle of a ship This is either the middle segment of a cruiser, or one of the two middle segments of the battleship. Either it has the squares to the left and right occupied by ship segments and the ones above and below it empty or the squares above and below are occupied by ship segments and the ones to the left and right are empty. In both cases, the diagonally adjacent squares are filled with water. In fact, any time a square is occupied, all of the diagonally adjacent squares must have water in them, because ships can't touch diagonally.

The most basic strategy to Battleships solving has three parts:

1. Fill in what you know in squares adjacent to given ship segments.
2. Fill in water in rows and columns that have all of the ship segments already in place.
3. Fill in ship segments in rows and columns that must have all of their remaining empty spaces filled in order to equal the corresponding number.

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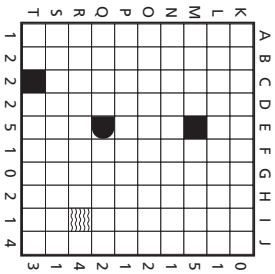


Figure 1.1

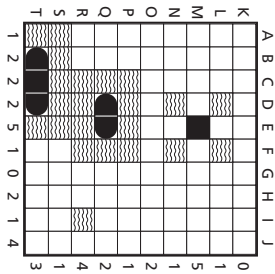


Figure 1.2

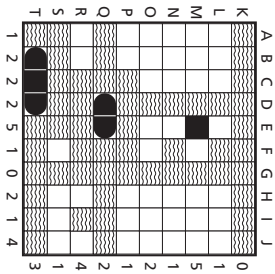


Figure 1.3

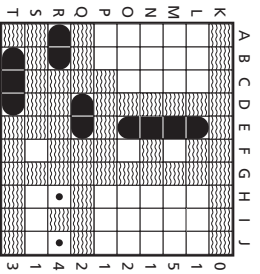


Figure 1.4

For the simplest Battleships, this is all that is needed to solve the puzzle. Take a look at the puzzle in Figure 1.1. (Larger versions of the six sample puzzles appear on the last page, for you to follow along on.)

Throughout this guide, columns of the grid will be referred to with uppercase letters A through J, while rows will be referred to with letters K through T. In this way, any square in the grid can be referenced with two letters: AK means the upper left square where column A crosses row K. In the example at left, there are ship segments at CT, EM, and EQ, and water at IR.

To solve this puzzle, start with strategy 1: Fill in squares adjacent to the given ships. You know that the flat side of an end of a ship must have a ship segment next to it, so you can fill in DQ with a ship segment—it must be the other end of a destroyer because the row can only contain two ship segments. You can then fill in the spaces surrounding the destroyer with water. The ship segment at CT must be the middle part of a cruiser or one of the middle sections of the battleship. The ship must be horizontal (if it were vertical, it would extend below the bottom edge of the grid), so the squares to the left and right of CT (BT and DT) must have ship segments in them. Since row T can only have a total of three ship segments in it, BT-CT-DT must be a cruiser. The squares surrounding it can be filled in with water. The filled-in square at EM is also the middle section of a cruiser or one of the middle sections of the battleship. You don't know which yet, but you know that the four squares that touch a ship segment diagonally must be water, because ships never touch diagonally. Keep this in mind at all times for easier solving. Your grid should now look like Figure 1.2.

Now use strategy 2. Rows K, Q, and T, and columns D and G have all of their ship segments accounted for, so you can fill all the blank squares in those rows and columns with water. Your grid should now look like Figure 1.3.

Now look at EM. It must be part of a ship that goes vertically because DM is water, and the ship can no longer extend to the left. You could have figured this out using strategy 3 instead, since column E has only three blank spaces, all of which need to be filled with ship segments to reach the five needed. Since four segments in a row in column E are filled, that must be the battleship. Row R also has to have all of its empty spaces filled with ship segments. The left part, AR-BR, must be a destroyer. The right part, HR and JR, must have ship segments in them, too. Don't make the mistake of filling them in with submarines—although they may be submarines, each one could also be the top half of a destroyer. To indicate that it's filled in

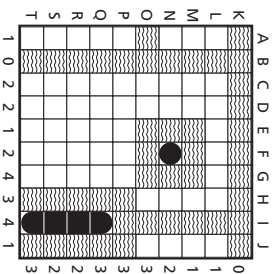


Figure 6.10

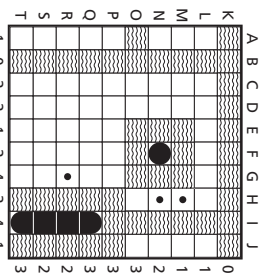


Figure 6.11

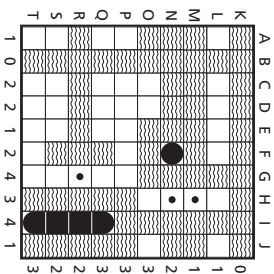


Figure 6.12

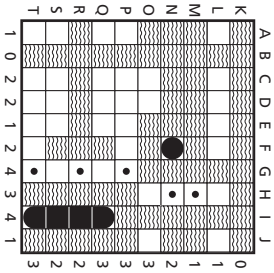


Figure 6.13

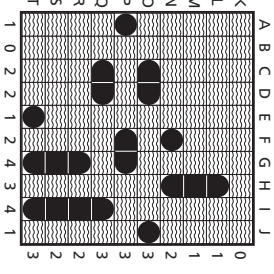


Figure 6.14

Don't be discouraged, though. You've made it this far. You'll sink this fleet yet! Move on to advanced strategy. Where can the longest not-yet-placed ship go? The cruisers can only go in column G, column H, or row P. If it went in row P though, row O would be impossible. Here's why: If the cruiser were at CP-DP-EP or at DP-EP-FP, then CO and DO would have to be water, leaving too few empty spaces in row O. If the cruiser were at EP-FP-GP, then DO and HO would have to be water, again leaving too few empty spaces in row O. Since those are the only three places where the cruiser can go in row P, it must not go there. That leaves you only two places for the two cruisers, so they must go in those places: columns G and H. You don't know exactly where, but you do know that GR must contain a ship segment, as well as both HM and HN (Figure 6.11).

Using basic strategies now, you get Figure 6.12. Now, if GP were empty, then column G would need a battleship to fill it. But you've already used the battleship, so GP must have a ship segment. Similarly, GT can't be empty or else column G would need a battleship, so it too has a ship segment (Figure 6.13).

From here you can use basic strategies (starting off with water in HQ since it's diagonally adjacent to GP, which has a ship segment in it) to finish up (Figure 6.14).

So there you have it. There are plenty of other strategies to use, depending on the puzzle. For example, if all the submarines are already in place, then every remaining ship segment must be a part of a longer ship, and if there's a column with a one that crosses a row with a one then it must contain water, since if it contained a ship, it would be a fifth submarine. Similarly, if three submarines are in place and there's a row with a two that has both adjacent rows filled with water, then you know the row with the two has to be a destroyer, not two submarines, since only one submarine is left to place. And then there's the case when ... well, you get the idea. Part of the fun is discovering new strategies. And the best way to develop new strategies is to solve lots of puzzles. Good luck and ahoy!

—Peter Gordon & Mike Shenk

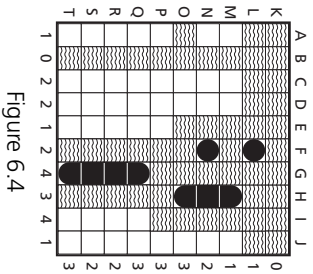


Figure 6.4

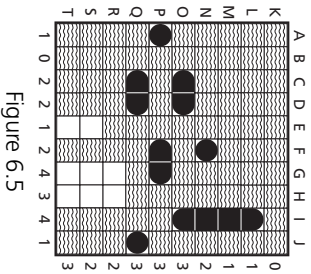


Figure 6.5

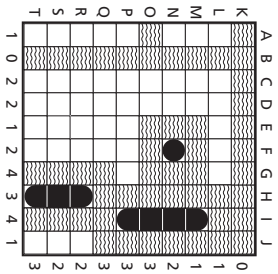


Figure 6.6

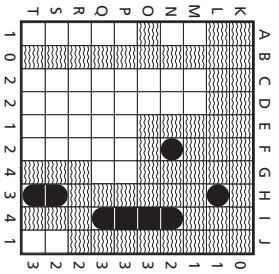


Figure 6.7

last, there is an impossibility. Row R must have another destroyer in it, but there are none left. Also, columns G and H must both have cruisers in them adjacent to each other (Figure 6.5).

Onward you go, to IM-IN-O-IP. Start by surrounding the battleship with water and completing its column with water. Next, complete column H with a cruiser at HR-HS-HT and surround it with water. This makes column G impossible (Figure 6.6).

Next up is IN-O-IP-OQ. Start by surrounding the battleship with water and completing its column with water. Next, complete column H with a submarine at HL and a destroyer at HS-HT. Complete row L with water and surround the destroyer with water and column G becomes impossible (Figure 6.7).

Just three more possibilities. At this point you may start worrying that none of these three will work and that you'll have to go back and redo everything you've done so far to find your mistake. That's the wrong way to think. Have confidence! Keep working.

Moving down one more spot yields IO-IP-OQ-IR. As usual, surround the battleship with water and complete its column with water. Then complete column H with a destroyer at HL-ML and a ship segment at HT. Complete rows L and M with water and fill in water at GS (since it's diagonally adjacent to HT). Complete column G with a cruiser at GP-GQ-GR and a ship segment at GT, and surround the cruiser with water. Row O can be completed with a destroyer at CO-DO, and the water surrounding it can be filled in. Now both AN and AP must have ship segments to complete rows N and P, but column A can only have one ship segment in it, so it's yet another impossibility (Figure 6.8).

The next possibility is IP-OQ-IR-IS. This one doesn't last long at all. After surrounding the battleship with water and completing its column, there's an impossibility in row O (Figure 6.9).

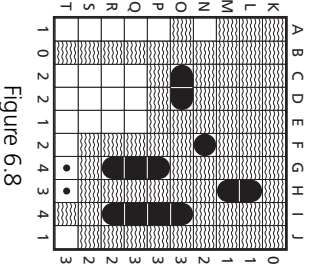


Figure 6.8

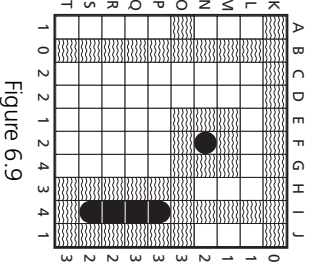


Figure 6.9

with an unidentified ship segment, use a small dot in the middle of the square. Your grid should now look like Figure 1.4.

Whenever you fill in a ship segment, go back to strategy 1. Here, you can put water in FM and FO, and IS, too, since it touches a ship segment diagonally. And using strategy 2, you can put water in what's left of columns A and B and rows L and N, to get Figure 1.5.

It's time to use strategy 3 again. Column F must have a submarine in that empty space (it can't be something bigger because it's surrounded by water), and row M must have all four of its empty spaces filled with ship segments, making a submarine on the left and a cruiser on the right. This gives you Figure 1.6.

When you return to strategy 1 this time, you'll find it doesn't help, but strategy 2 does: You can fill in the blank spaces of columns C, H, and I and row S with water, since they already contain the required number of ship segments. Your grid now looks like Figure 1.7.

The dots in row R are surrounded by water, so they must be submarines. And since you need two more ship segments in column J and have two spaces available, you can finish off the puzzle by filling those spaces with a destroyer. A quick double check verifies that you have all the required ships, so you're done (Figure 1.8).

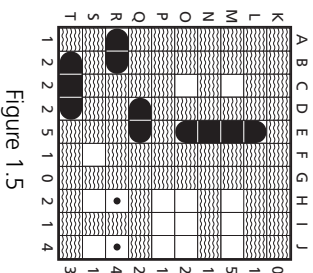


Figure 1.5

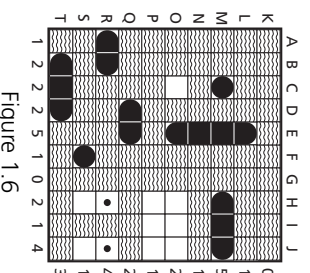


Figure 1.6

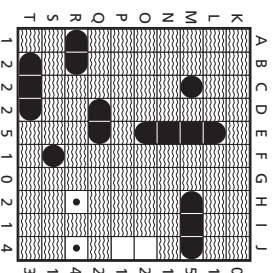


Figure 1.7

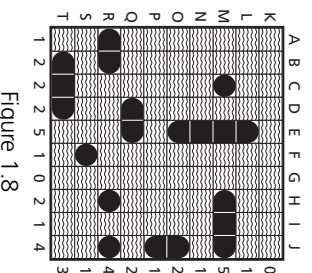


Figure 1.8

The three basic strategies, though certainly important, will take you only so far: If you hope to regularly finish all but the easiest puzzles, you'll need more advanced strategies. When you've reached a point at which the basic strategies provide no further help, the simplest advanced strategy is to try placing the largest ship that hasn't yet been located. If you haven't found where the battleship goes, try finding a spot for it. If the battleship is already in place, then look for spots for the cruisers. Here's an example (Figure 2.1).

First, of course, you should fill in what you can using the basic strategies. Your grid should now look like Figure 2.2.

Now, consider where the battleship can go. It must go in a row or column that has a four or higher. Only two qualify: row L and column E. It can't fit in row L, though—that row already contains a ship that can't be the battleship since there's only room for it to be a cruiser or destroyer, and the battleship can't go in the right part of the row since then there would be more than four spaces filled by ships. So the battleship must go in column E. But where in the column? Its top can be at either EN, EO, EP, or EQ. You don't know which, but if you look at those four possibilities, you'll notice that in every case EQ is filled with a ship segment. So you can put a dot in EQ. Any time you put a dot in a square, you can immediately put water in the diagonally adjacent

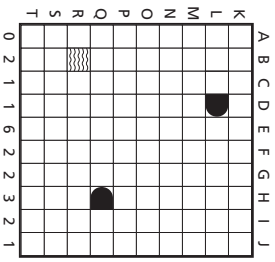


Figure 2.1

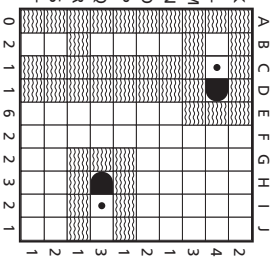


Figure 2.2

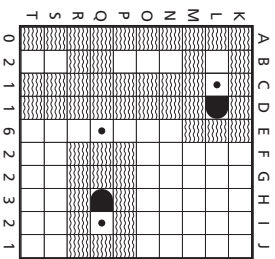


Figure 2.3

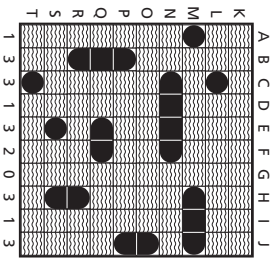


Figure 5.7

squares (since ships never touch diagonally), so fill in FP and FR with water. And look at row Q. It has its three ship segments, so the rest of it must be water—fill them in (Figure 2.3).

When you've filled in all the spaces surrounding a square that contains a dot, you can convert the dot to its proper ship segment. Here, square IQ must be the right end of a destroyer. Whenever you make a change using an advanced strategy, go back to you basic strategies to see if you can use them. Row R has only one empty space, and it has a one at the end of it, so that empty square must be filled with a ship segment. Since you don't yet know what type it is, put a dot in it. That dot gives you water in FS. Your grid should now look like Figure 2.4.

Now you'll need to think. Consider the four places the battleship can go. The first is EN-EQ-EP-EQ. That's not possible because to put it there, ER would have to contain water, but it doesn't. The next possibility is EO-EP-EQ-ER. It fits, but putting it there would require water in EN and ES, leaving only one more blank space in column E, and two are needed to bring the total number of ship segments to six. So that possibility is out, too. The next possibility, EP-EQ-ER-ES, has the same problem—EO and ET would need to be water, leaving only one blank space (at EN), when two are needed to bring the total to six. So the last possibility, with the battleship at EQ-ER-ES-ET, must be correct; fill it in. That allows you to put water at EP and FT (Figure 2.5).

Now go back to the basic strategies. Fill in square BP with a dot (remember not to assume it's a submarine—it could extend upward!), and EN-EO with a destroyer. This puts water at FN, FN, and FO (Figure 2.6).

Continue using the basic strategies. Column F must contain a destroyer at FK-FL, and water must go in GK, GL, and GM. Now look at row M. HM-IM-JM must be a cruiser. This puts water in HL, IL, JL, GN, HN, IN, and JN. You can also fill in BN, IK, IO, IS, IT, JK, JO, JS, JT, BT, GT, and HT with water, giving you Figure 2.7.

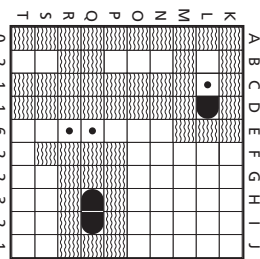


Figure 2.4

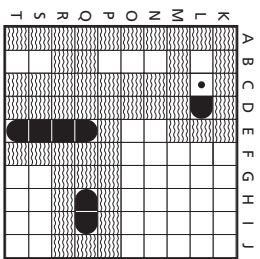


Figure 2.5

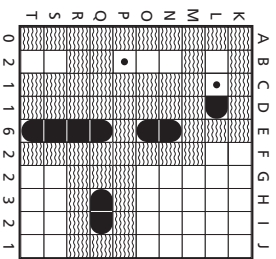


Figure 2.6

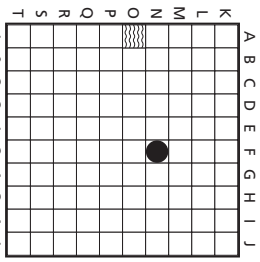


Figure 6.1

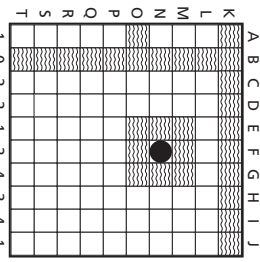


Figure 6.2

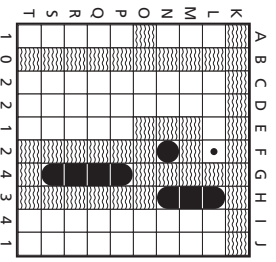


Figure 6.3

spaces. If it went in row M, then CL and CN would both contain water, making column C impossible. So the battleship goes at CN-DN-EN-FN. With basic strategies, you'll get Figure 5.6.

Check out the submarines—they've all been placed. That means the dot at JP can't be a submarine, so it must be part of a destroyer. And that gives you enough information to finish the puzzle (Figure 5.7).

One more puzzle (Figure 6.1) and then you're on your own to discover new, more advanced strategies. Basic strategies doesn't help much (Figure 6.2).

Our advanced strategies don't help much either. The battleship can go in a number of places, and none of the rows or columns are within one of being filled. What can you do? Sometimes solving the really hard puzzle requires trial and error. You just have to take a guess, and if it doesn't work, you have to take another.

The battleship can go in two places in column G and in six places in column I. Try them until one works. As soon as one works you can stop, because all Battleships have unique answers. Try the first of two locations in column G, namely GP-GQ-GR-GS. After surrounding the battleship with water, and completing column G with water, the next step is to complete column H with a ship segment at HL-HM-HN and complete column F with a ship segment at LF. But wait! Now row L has two ship segments (Figure 6.3), which is one too many, so the battleship doesn't go at GP-GQ-GR-GS. (If you went ahead and did basic strategies, you may have reached an impossible situation elsewhere in the grid.)

Moving on, try the battleship at the bottom of column G. Surround the ship with water and complete column F with a ship segment at FL and complete column G with water at GL. Now look at row L. Make the ship segment a submarine and complete the row with water. Now complete column H with a cruiser at HM-HN-HO and surround it with water. This leaves column I with four consecutive spaces that need to be filled, but the battleship can't go there since it's already in column G (Figure 6.4).

You now know the battleship is in column I. Try placing it next to the top, at IL-IM-IN-IO. (It can't start at IK since row K has no ship segments.) Surround the ship with water, and complete column I with water. Complete rows L, M, and N with water, and complete row O with a destroyer at CO-DO. Fill in the water surrounding the destroyer and complete row P with a submarine at AP and a destroyer at FP-GP. Surround that destroyer with water, and complete columns A and F with water. Now row Q must have a destroyer at QO-DQ and a submarine at IQ. Surround the destroyer with water and complete columns C, D, and J with water. At

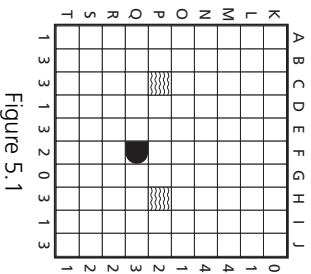


Figure 5.1

It's time for a tougher (Figure 5.1). By now, the basic strategies should be second nature to you: applying them, your grid should look like Figure 5.2.

Now you'll need some deep thought: Where can the battleship go? Only in row M or row N. But you can be even more specific than that: It can't go at BM-CM-DM-EM because then AN, BN, CN, DN, EN, and FN would contain water, not leaving enough spaces for four ship segments in row N. Similarly, it can't go at BN-CN-DN-EN, because then row M would be impossible. So either the battleship goes at ABCD in one of these rows (M or N) with F and HJ occupied in the other or it goes at CDEF in one of these rows with A and HJ occupied in the other. In either case, the one at the bottom of column A is filled in row M or N, as is the one of column D and the one of column I. So you can put water in all the empty spaces in columns A, D, and I other than those in rows M and N (Figure 5.3).

Back to the basic strategies—they'll bring you to Figure 5.4.

You already know the battleship and one of the cruisers will go somewhere in rows M and N. Where will the other cruiser go? The only possibility is column B. Row Q and column E can be ruled out for obvious reasons. Columns C, H, and J are out because, as discussed above, at least one square in each of those columns will be part of a horizontal ship in row M or N. The cruiser in column B will account for all three hits in the column, so the battleship must go at CDEF of either row M or N, and either AM or AN must be a submarine. You can now place the cruiser in column B. Since it must include BP, its top is at BN, BO, or BP. If it were at BN or BO, then both AN and CN would contain water, making rows M and N impossible to finish, so the top of the cruiser must be at BP. Placing the cruiser at BP-BQ-BR and—of course—applying the basic strategies, yields Figure 5.5.

Now look at column C. Three of those four squares must have ship segments. The battleship fits horizontally into either row M or N, taking up one of those three

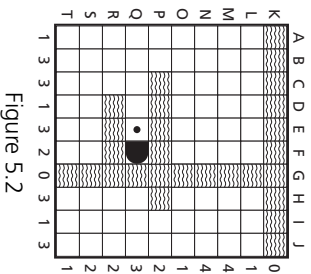


Figure 5.2

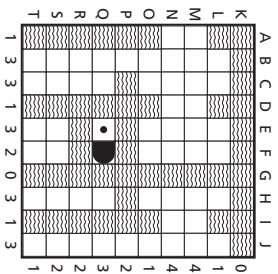


Figure 5.3

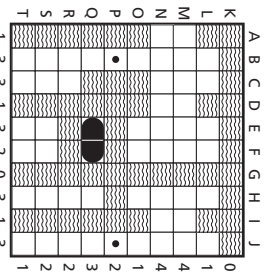


Figure 5.4

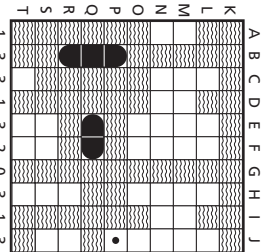


Figure 5.5

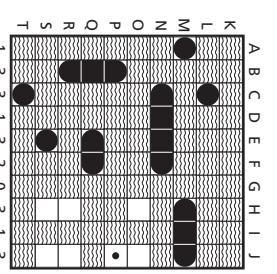


Figure 5.6

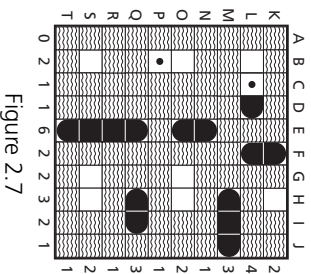


Figure 2.7

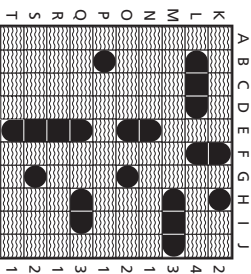


Figure 2.8

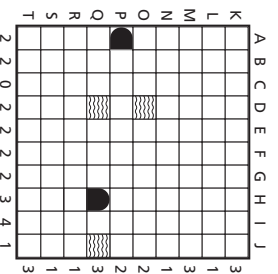


Figure 3.1

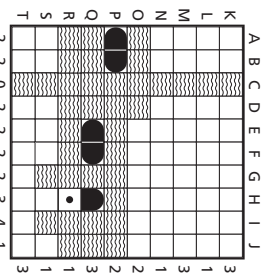


Figure 3.2

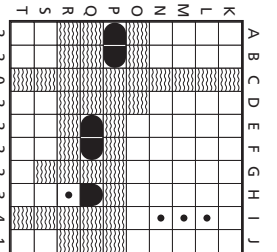


Figure 3.3

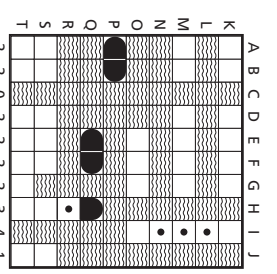


Figure 3.4

You can complete the puzzle with the basic strategies. Finish rows K and L first, and then columns B, G, and H. When you're done, your solution should look like Figure 2.8.

This example illustrates how a typical Battleships puzzle of medium difficulty can be solved. You start with the three basic strategies, then use some logical thinking to break through to the next step, and finish by again using the basic strategies.

More difficult puzzles require more of these thought steps. Here's an example (Figure 3.1). Using the basic strategies, you can get to the point shown in Figure 3.2.

Now try the advanced strategy of finding where the biggest remaining ship goes. In this case, the biggest ship not yet placed is the battleship. It can only go in column I (the only row or column with a four or higher), at either IK-IL-IM-IN or IL-IN-IO. In both cases, IL, IM, and IN have ship segments in them, so you can fill those in. You can also put water in IT, since the battleship in the top of column I will use up all four allotted ship segments (Figure 3.3).

As always, after using an advanced strategy, you should reapply the basic strategies. You'll find you can put water in all the empty spaces of rows L and N, as well as in HK, HM, HO, JK, JM, and JO since they're diagonally adjacent to ship segments (Figure 3.4).

This is as far as the you'll get with the basic strategies. It's time to try advanced strategy again. You know roughly where the battleship goes (somewhere at the top of column I); consider now where the cruisers can go. Only rows and columns with a three or higher are possibilities. You can rule out column I (since the battleship accounts for all four segments there), row M (since, after the component of the battleship is taken into account, there are only two more ship segments in that row), and row Q (which already has its three ship segments). That leaves column H, row K, and row T as possibilities. Two of those three must contain cruisers. If a cruiser goes in row K, it can only fit in the center section

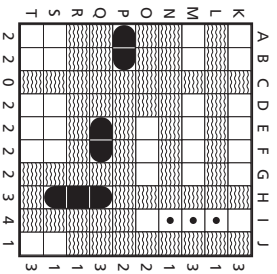


Figure 3.5

of four consecutive white squares. No matter where a cruiser fits in those four squares, square FK will have a ship segment in it. Similarly, if a cruiser goes in row T, it can only fit in the center section of five consecutive white squares. No matter where it fits in those five squares, square FT will have a ship segment in it. Since column F already contains one ship segment (FQ), the two cruisers can't go in both rows K and T at the same time, or else column F would have one too many ship segments in it. So one of the cruisers must be located in column H (and the other in either row K or row T). Column H can have only three ship segments in it, so the cruiser must be a part of what's already there. Fill it in with the surrounding water (Figure 3.5).

Now back to the basic strategies. Fill in water in the remaining spaces of row S; then it's clear that JT is a submarine (Figure 3.6).

Bingo! You now know the cruiser can't go in row T, since there's already a submarine in it, leaving only two remaining ship segments. So the cruiser must be in row K. You don't know its exact location; there are two possibilities, but in either case EK and FK must contain ship segments, and AK, BK, and IK must contain water, since all three ship segments in that row will be used up by the cruiser (Figure 3.7).

Back to the basic strategies. The battleship location has been determined in column I. You can fill the empty spaces in columns E and F with water, making GO a submarine (Figure 3.8).

Basic strategies still haven't finished off the puzzle. So again, look for a place for the largest remaining ship. You need one more destroyer. Row K is out—it's reserved for the cruiser. There are only two places left on the board with two adjacent white spaces: AM-BM and AT-BT. If the ship went in AM-BM, then AT and BT would contain water, leaving row T with at most two ship segments in it, which isn't enough. So the destroyer must instead be at AT-BT (Figure 3.9).

And now, at last, you can finish the puzzle with the basic strategies (Figure 3.10).

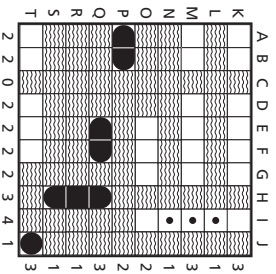


Figure 3.6

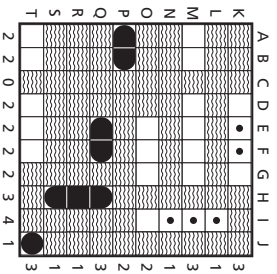


Figure 3.7

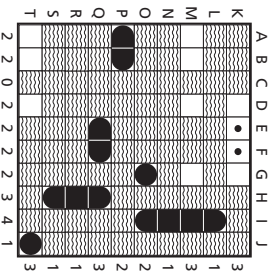


Figure 3.8

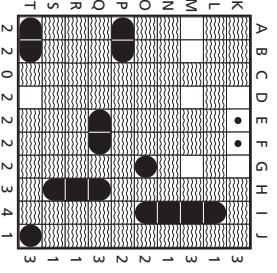


Figure 3.9

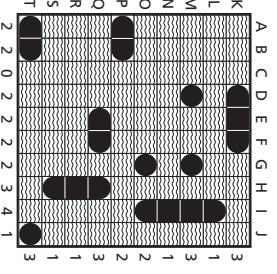


Figure 3.10

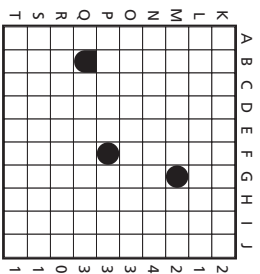


Figure 4.1

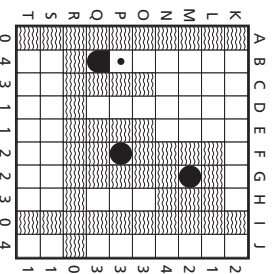


Figure 4.2

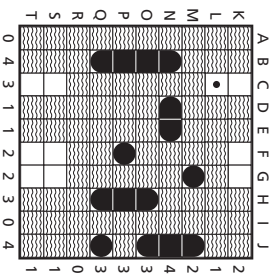


Figure 4.3

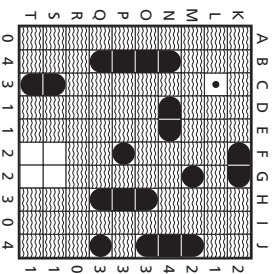


Figure 4.4

By now, you should know enough to get through all but the toughest of Battleships puzzles. Further advancement requires practice and more advanced strategies. Take a look at the next puzzle (Figure 4.1). After using the basic strategies, the puzzle should look like Figure 4.2.

The biggest ship not yet placed is the battleship. Where can it go? Plenty of places: It could fit in one place in row N, one place in column B, or in any of four places in column J. You probably don't want to try that many possibilities.

It's time for a different strategy. Look around the board for rows and columns that are almost determined. In particular, look for rows and columns in which the number of ship segments left to place is one less than the number of empty spaces. In this puzzle, row N needs four ship segments and has only five empty spaces. Row O needs three ship segments in the four remaining empty spaces. You'll find a similar condition in row Q, but for this puzzle you should concentrate on rows N and O. Consider square CN. If it's filled with a ship segment, then both BO and DO would have to contain water (since they're diagonally adjacent to CN). But that would leave only two empty spaces in row O for three ship segments—an impossibility! So CN can't contain a ship segment; fill it in with water. After filling CN with water, the basic strategies will take you a long way (Figure 4.3).

Now you go back to the first advanced strategy: Where can the biggest remaining ship go? In this case, you still need to place two destroyers. You can fit one of them in column C and the other in row K. They can't go anywhere else, so that's where they must be. The destroyer in row K must go at FK-GK, so CK is water, leaving CS-CT for the other destroyer (Figure 4.4).

From here, you just need to make the dot at CL a submarine and fill the blank squares with water, and you're done (Figure 4.5).